Patent claims

1.   A method for altering design data for producing a
component,   particularly   an   integrated   circuit
5   arrangement,

in   which   design   data   are   prescribed   (302)   which
stipulate   a   geometrical   design   (10)   which   is   to   be
altered for a component,

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in   which   the   design   data   are   used   to   produce   altered
design   data   which   are   stored   (308)   and   stipulate   a
geometrical   design   (10a)   which   is   altered   locally   in
comparison   with   the   geometrical   design   (10)   of   the
15   design data,

in   which   the   altered   design   data   (10a)   are   used   to
ascertain   (312)   an   assessment   criterion   (BM1,   GBM)   for
the altered design (10a),

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in   which   the   assessment   criterion   (GBM)   for   the   altered
design   (10a)   is   compared   (314)   with   an   assessment
criterion   (BM1,   GBM)   for   the   design   (10)   which   is   to   be
altered,

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and   in   which   the   unaltered   design   data   are   retained   or
replaced   (316,   318)   with   the   altered   design   data
depending on the comparison result,

30   with   a   plurality   of   cycles   of   alterations,   comparisons
and   decisions   about   replacement   being   performed
automatically.

2.   The method as claimed in claim 1, characterized in
35   that   a   region   (100)   for   the   local   alteration   and/or   the
size   of   this   region   (100)   is/are   ascertained   without
using   a   random   function,

or in that a region (100) for the local alteration and/or the size of this region is/are ascertained using a random function.

5   3.   The method as claimed in claim 1 or 2, characterized in that a region (100) for the local alteration and/or the size of this region (100) is/are selected on the basis of an even distribution or by favoring regions and/or sizes which particularly impair

10   the alteration of the assessment criterion (GBM) toward the aim of the method.

       4.   The method as claimed in one of the preceding claims, characterized in that a region (100) is

15   selected for producing the altered design data (10a) in the design stipulated by the design data which are to be altered,

       in that design data are ascertained which relate to the

20   design in the selected region (100),

       and in that the ascertained design data are altered on the basis of a prescribed function which brings about a geometrical alteration of the design in the selected

25   region.

       5.   The method as claimed in claim 4, characterized in that the geometrical alteration is relocation (308) of a design part in the region (100) by a prescribed

30   distance or by a prescribed number of points of a grid dimension and in a prescribed direction,

       and/or in that the geometrical alteration is mirror imaging of a design part in the region (100) on a

35   prescribed mirror axis,

       and/or in that the geometrical alteration is rotation

of a design part in the region (100) about a prescribed
center of rotation and through a prescribed angle of
rotation,

5   and/or in that the geometrical alteration is uniform or
nonuniform expansion or contraction of a design part in
the region (100) in at least one prescribed direction
and by at least one prescribed scaling factor,

10   and/or in that the geometrical alteration relates to
smoothing of lines of a design part in the region
(100),

       and/or   in   that   the   geometrical   alteration   is
15   replacement of the design part in the selected region
(100) with a design part from another region of the
design or with a prescribed design part or with a
corresponding design part of a design from an earlier
cycle of the method, the corresponding region being
20   situated at the same location in the design as the
selected region or having a similar geometry to the
selected region,

       and the corresponding region preferably being a region
25   from the best design ascertained in the method to date,

       and/or in that the geometrical alteration brings about
a change to the total area of the changed design (10a)
in comparison with the total area of the design (19)
30   which is to be changed.

       6.   The   method   as   claimed   in   claim 4   or   5,
characterized in that at least one stipulation for the
geometrical alteration is ascertained using a random
35   function.

       7.   The   method   as   claimed   in   one   of   the   preceding

claims, characterized in that the ascertainment of the assessment. criterion involves ascertaining (310) a critical area for short circuits, which area is ascertained for the altered design or region (100),

5   and/or a critical area for interruptions, which area is ascertained for the altered design (10a) or in the region (100),

and/or in that the ascertainment of the assessment

10   criterion involves ascertaining the number of corners (E1 to E4) or the number of edges (110 to 120) in the altered design (10a) or in the region (100),

and/or in that the ascertainment of the assessment

15   criterion involves ascertaining the current-carrying capacity (D) of at least one structure which is to be produced using the design (10, 10a),

and/or in that the ascertainment of the assessment

20   criterion   involves   ascertaining   the   coupling capacitance between an element of an integrated circuit arrangement which is to be produced and at least one structure which is to be produced using the design (10, 10a),

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and/or in that the ascertainment of the assessment criterion involves ascertaining the overlap (U) between an element of an integrated circuit arrangement which is to be produced and at least one structure which is

30   to be produced using the design (10, 10a),

and/or in that the ascertainment of the assessment criterion involves calculating the total area of the changed design (10a).

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8.   The method as claimed in one of the preceding claims, characterized in that the assessment criterion

is an overall assessment criterion (GBM) which is
ascertained from at least two different assessment
criteria (BM1, BM2),

5   and/or in that weighting factors (W1, W2) with
different values are prescribed and are used for
weighting the assessment criteria (BM1, BM2) when
ascertaining the overall assessment criterion (GBM).

10   9.   The method as claimed in one of the preceding
claims, characterized in that a decision about
retaining and/or replacing the unaltered design data is
made (316, 318) on the basis of a random function.

15   10.   The method as claimed in claim 9, characterized in
that the dependency of the decision on the random
function is reduced on the basis of the number of
cycles (n).

20   11.   The method as claimed in one of the preceding
claims, characterized in that a design (10, 10a) has a
grid dimension chosen for it which is equal to the
width of a mask writing beam which is used for
transferring the design (10, 10a) onto a lithographic
25   mask,

or in that a design (10, 10a) has a grid dimension
chosen for it which is less than the width of the mask
writing beam.
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12.   A data processing installation (550) for
automatically altering design data for producing a
component, particularly an integrated circuit
arrangement,
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having a memory unit (552) for storing design data
which are to be altered and stipulate a geometrical

design (10) which is to be altered for a component,

having a change unit (554) which uses the design data
to produce altered design data for an altered design
5   (10a) and stores them in the memory unit (552),

having an assessment criterion ascertainment unit (558
to 562) which ascertains an assessment criterion (GBM)
from the altered design data,
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having a comparison unit which compares the assessment
criterion (GBM) for the altered design (10a) with an
assessment criterion for the design which is to be
altered,
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and having a control unit (572) which retains the
unaltered design data or replaces them with the altered
design data depending on the comparison result,

20 and which automatically prompts the performance of a
plurality of cycles of alterations, comparisons and
decisions about replacement.

13. The data processing installation (550) as claimed
25 in claim 12, characterized by at least one further unit
whose operation involves carrying out a method as
claimed in one of claims 1 to 11.

14. A program or data store having a program which
30 contains a command sequence whose execution by a
processor (600) involves carrying out a method as
claimed in one of claims 1 to 11.

Abstract

Method for altering design data for producing a
component, and associated units

The document explains a method in which design data are
prescribed which stipulate a geometrical design (10)
for a component. The design is used to produce an
altered geometrical design, for example through
relocations in a region (100). For the two designs,
assessment criteria are ascertained and compared.
Depending on the comparison result, the unaltered
design data are retained or are replaced with altered
design data. This method is carried out for a plurality
of cycles in succession in order to optimize the
design.

(Figure 1B)